

CLAIMS

What is claimed is:

- 1 1. A semiconductor device with ancillary electronic component comprising:
2 a semiconductor device including a first connection to a first electrical line and
3 a second connection to a second electrical line; and
4 an ancillary electronic component connected directly to the semiconductor
5 device and connected between the first connection and the second
6 connection.
- 1 2. The semiconductor device of claim 1 further comprising connecting means for
2 connecting the semiconductor device to a second electronic component, the connecting
3 means providing clearance to accommodate the ancillary electronic component
4 between the semiconductor device and the second electronic component.
- 1 3. The semiconductor device of claim 1 further comprising:
2 a plurality of electrical contact elements connected to and extending a first
3 distance from the semiconductor device;
4 the ancillary electronic component extending from the semiconductor device a
5 second distance, the second distance such that when the semiconductor
6 device is connected to a corresponding second component, the
7 ancillary electronic component will fit at least in part between the
8 semiconductor device and the corresponding second component.

1 4. The semiconductor device of claim 3 wherein at least some of the plurality of
2 electrical contact elements are composite, free-standing resilient contact structures and
3 wherein said ancillary electronic component is a travel stop structure which defines a
4 minimum separation between said semiconductor device and the corresponding
5 second component.

1 5. The semiconductor device of claim 3 wherein at least some of the plurality of
2 electrical contact elements are free-standing resilient contact structures primarily
3 comprising a resilient material.

1 6. The semiconductor device of claim 1 further comprising:
2 a second electronic component comprising in turn a plurality of electrical
3 contact elements connected to and extending a first distance from the
4 second electronic component, the plurality of electrical contact elements
5 for connecting to the semiconductor device;
6 the ancillary electronic component extending from the semiconductor device a
7 second distance, the second distance such that when the semiconductor
8 device is connected to the second electronic component, the ancillary
9 electronic component will fit at least in part between the semiconductor
10 device and the second electronic component.

1 7. The semiconductor device of claim 6 wherein at least some of the plurality of
2 electrical contact elements are composite, free-standing resilient contact structures.

1 8. The semiconductor device of claim 6 wherein at least some of the plurality of
2 electrical contact elements are free-standing resilient contact structures primarily
3 comprising a resilient material.

1 9. The semiconductor device of claim 6 wherein the second electronic component
2 is a printed circuit board.

1 10. The semiconductor device of claim 6 wherein the second electronic component
2 is a socket.

1 11. The semiconductor device of claim 1 further comprising:
2 a first terminal adjoining the surface of the semiconductor device for
3 connecting to first circuitry of the semiconductor device;
4 a second terminal adjoining the surface of the semiconductor device for
5 connecting to second circuitry of the semiconductor device, and
6 wherein the ancillary electronic component is electrically connected to
7 the first terminal and the second terminal.

1 12. The semiconductor device of claim 11 wherein the ancillary electronic device is
2 a capacitor.

1 13. The semiconductor device of claim 11 wherein the first circuitry is Vdd and the
2 second circuitry is Vss, and the ancillary electronic device is a capacitor.

1 14. The semiconductor device of claim 11 wherein the second circuitry is ground.

1 15. The semiconductor device of claim 11 wherein the first circuitry is a first
2 voltage level and the second circuitry is a second voltage level.

1 16. The semiconductor device of claim 15 wherein the first and second voltage
2 levels are each selected from the group consisting of Vdd, VddA, VddB, Vss, VssA,
3 VssB, Vref and ground.

1 17. The semiconductor device of claim 1 further comprising a plurality of such
2 ancillary electronic devices.

1 18. The semiconductor device as in claim 3 wherein said ancillary electronic
2 component is selected from the group consisting of: (a) a capacitor; (b) a resistor; (c)
3 an inductor; (d) a transistor; (e) a semiconductor integrated circuit; and wherein said
4 semiconductor device comprises an integrated circuit.

1 19. The semiconductor device as in claim 18 wherein said ancillary electronic
2 component is mounted directly on said semiconductor device.

1 20. An assembly comprising said semiconductor device as in claim 3 wherein said
2 corresponding second component comprises another plurality of electrical contact
3 elements connected to and extending a first distance from said corresponding second

4 component, said another plurality of electrical contact elements for making electrical
5 contact with said semiconductor device.

1 21. An assembly as in claim 20 wherein said corresponding second component
2 comprises a printed circuit board.

1 22. An assembly as in claim 20 wherein said corresponding second component is
2 arranged in a spaced apart relation to and generally parallel with said semiconductor
3 device.

1 23. An assembly as in claim 1 wherein said ancillary electronic component
2 comprises a travel stop structure which defines a minimum separation between a
3 surface of said semiconductor device and another surface.

1 24. A semiconductor assembly comprising:
2 a semiconductor integrated circuit (IC) having interconnection pads fabricated
3 on a surface of said semiconductor integrated circuit and having an
4 insulating layer which exposes said interconnection pads;
5 a first circuit element in a structure attached to said surface, said first circuit
6 element being coupled electrically to a second circuit element in said
7 semiconductor integrated circuit.

1 25. A semiconductor assembly as in claim 24 wherein said structure is a travel
2 stop structure which defines a minimum separation, between said surface and a

3 substrate having a contact element disposed on said substrate, in which said contact
4 element is electrically coupled to said semiconductor integrated circuit.

1 26. A semiconductor assembly as in claim 25 wherein said first circuit element
2 comprises a ground shield.

1 27. A semiconductor assembly as in claim 25 wherein said first circuit element
2 comprises one of (a) a capacitor; (b) a resistor; (c) a driver circuit; (d) an inductor; (e)
3 a shield; or (f) a routing trace.

1 28. A semiconductor assembly as in claim 25 wherein said structure comprises a
2 multilayer structure which is formed after said semiconductor IC is created.

1 29. A semiconductor assembly as in claim 24 wherein said first circuit element
2 comprises an insulated ground shield.

1 30. A semiconductor assembly as in claim 24 wherein said first circuit element
2 comprises one of (a) a capacitor; (b) a resistor, (c) a driver circuit; (d) an inductor;
3 (e) a shield; or (f) a routing trace.

1 31. A semiconductor assembly as in claim 24 wherein said structure comprises a
2 multilayer structure which is formed after said interconnection pads and said insulating
3 layer have been formed on said semiconductor IC.

1 32. An interconnect assembly comprising:
2 a substrate;
3 a resilient contact element having at least a portion thereof which is capable of
4 moving to a first position in which said resilient contact element is in
5 mechanical and electrical contact with another contact element, said
6 resilient contact element being disposed on said substrate;
7 a stop structure disposed on said substrate, said stop structure defining said
8 first position and containing a first circuit element which is coupled to a
9 second circuit element on said substrate.

1 33. An interconnect assembly as in claim 32 wherein said another contact element
2 is disposed on another substrate, and wherein said stop structure defines a separation
3 between said substrate and said another substrate in which said resilient contact
4 element is in mechanical and electrical contact with said another contact element.

1 34. An interconnect assembly as in claim 33 wherein said stop structure is
2 disposed proximally adjacent to said resilient contact element on said substrate

1 35. An interconnect assembly as in claim 33 wherein said resilient contact element
2 comprises a spring structure.

1 36. An interconnect assembly comprising:
2 a first substrate;
3 a first contact element disposed on said first substrate;

4 a stop structure disposed on said first substrate, said stop structure defining a
5 first position of a resilient contact element in which said resilient
6 contact element is in mechanical and electrical contact with said first
7 contact element and wherein said stop structure comprises a first circuit
8 element.

1 37. An interconnect assembly as in claim 36 wherein said resilient contact element
2 is disposed on a second substrate and wherein said resilient contact element has at
3 least a portion thereof which is capable of moving to said first position when said
4 resilient contact element is compressed.

1 38. An interconnect assembly as in claim 37 wherein said stop structure is
2 disposed proximally adjacent to said first contact element.

1 39. An interconnect assembly as in claim 37 wherein said first circuit element
2 comprises a ground shield.

1 40. An interconnect assembly as in claim 37 wherein said first circuit element is
2 coupled to a second circuit element in said first substrate.

1 41. An interconnect assembly comprising:
2 a first substrate having a first surface with first contact elements;

3 a second substrate having a second surface with second contact elements, said
4 first surface facing said second surface and wherein a space exists
5 between said first surface and said second surface;
6 a plurality of interconnect elements, each respectively electrically coupling a
7 contact element of said first contact elements to a contact element of
8 said second contact elements;
9 an electrical component attached to one of said first surface and said second
10 surface and occupying at least a portion of said space and coupled to at
11 least one contact element of said first contact elements or said second
12 contact elements.

1 42. An interconnect assembly as in claim 41 wherein said first substrate comprises
2 a semiconductor integrated circuit and wherein said plurality of interconnect elements
3 are attached mechanically to at least one of said first substrate and said second
4 substrate.

1 43. An interconnect assembly as in claim 42 wherein said second substrate
2 comprises a printed circuit board and said electrical component is selected from the
3 group consisting of (a) a capacitor; (b) a resistor; (c) an inductor; (d) a transistor;
4 and (e) another semiconductor integrated circuit.

1 44. An interconnect assembly as in claim 41 wherein said electrical component
2 comprises a travel stop structure which defines a minimum separation between said
3 first surface and said second surface.

1 45. An interconnect assembly as in claim 43 wherein said plurality of interconnect
2 elements comprise free-standing resilient contact structures.

1 46. An interconnect assembly as in claim 43 wherein said plurality of interconnect
2 elements comprise ball structures.

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